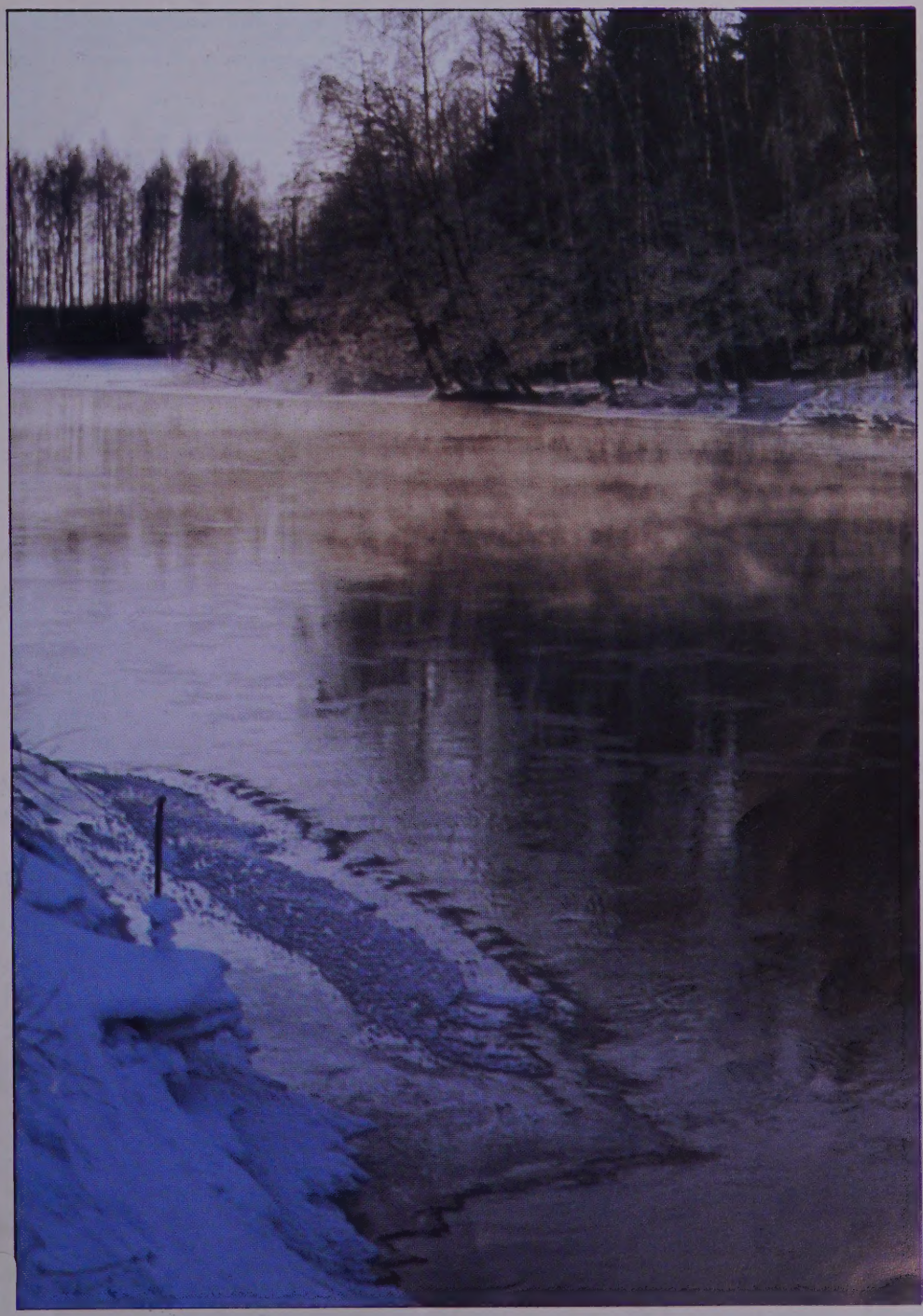
RESEARCH PROGRAMME 1986

OF THE

WATER RESEARCH INSTITUTE

JUN 25 1986



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NATIONAL BOARD OF WATERS, FINLAND
WATER RESEARCH INSTITUTE

PROJECTS 1986

HYDROLOGICAL OFFICE

Observation Activities — Hydrological Service

■ Hydrological Measurements

- ○ Areal precipitation and water equivalent of snow (J. Perälä)
- ○ Water stage and water level observations (M. Reuna)
- ○ Discharge measurements (V. Hyvärinen)
- ○ Studies of small hydrological basins (P. Seuna)
- ○ Evaporation (J. Järvinen)
- ○ Development and automatization of hydrometric measurements (M. Puupponen)
- ○ Soilwater and groundwater; soil frost (J. Soveri)
- ○ Ice and temperature observations in watercourses (O. Laasanen)
- ○ Groundwater in the bedrock (T. Tirronen)

■ Registration and Publication of Hydrological Data

- ○ An information system for water resources (Y. Sucksdorff)
- ○ Bathymetric mapping of inland waters (Y. Sucksdorff)
- ○ Drainage basins of Finland (M. Ekholm)
- ○ Monthly hydrological reports, hydrological year books, information on water situation (V. Hyvärinen)
- ○ Water level and discharge registers (J. Henttonen)

Research

■ Wintertime Hydrology

- ○ The origin of small water-openings in lake ice (O. Laasanen)
- ○ Ice problems in the river Tornionjoki (O. Laasanen)
- ○ Ice reduction of discharge (V. Hyvärinen)
- ○ Snowcover in Finland (J. Perälä)

■ Soil and Ground waters

- ○ Estimation on the influence of gravel exploitation to water and material balance (J. Soveri)
- ○ On the influence of soil moisture and groundwater variations on gravity (S. Tattari-Pesonen)
- ○ Developing methods for evaluating groundwater replenishment at different geological conditions (K. Granlund)
- ○ Seasonal variation of groundwater level (T. Tirronen)
- ○ Water balance of a sandy area (S. Tattari-Pesonen)

■ Airborne Pollution of Water Resources

- ○ The influence of geohydrological factors on groundwater acidification (J. Soveri)
- ○ Influence of hydrological factors on the acidity of watercourses (P. Seuna)
- ○ Concentrations and depositions in the snowpack (J. Soveri)

■ Non-Point Loading

- ○ Hydrological effects of silvicultural activities (P. Seuna)
- ○ Hydrological effects of agriculture (P. Seuna)

■ Hydrological models

- ○ Snowmelt models for watercourses (B. Vehviläinen)
- ○ Forecasting model for Perhonjoki (B. Vehviläinen)
- ○ Real time flood forecasting (B. Vehviläinen)
- ○ Forecasting model for Tornionjoki (B. Vehviläinen)
- ○ The use of statistical error models in flood forecasting (B. Vehviläinen)
- ○ Development of snow models (J. Forsius)
- ○ Combination of a physical flood routing model in flood forecasting (B. Vehviläinen)
- ○ Forecasting model for river Siikajoki (B. Vehviläinen)
- ○ Hydrological forecasting model for Kemijoki (B. Vehviläinen)
- ○ Applications of flow and dispersion models to rivers (J. Forsius)

■ Special Investigations

- ○ Closed lakes in Finland (E. Kuusisto)
- ○ Low flows in Finnish watercourses (E. Kuusisto)
- ○ Hydrology of Finnish lakes (E. Kuusisto)
- ○ Heat energy transport in a waterbody caused by water intake and outlet (K. Lehtinen)
- ○ The critical minimum discharges and their return periods in some water supply river systems (R. Leppäjärvi)

Consultant Services

- ○ Calibration of current meters (M. Puupponen)
- ○ Discharge measurements of hydropower plants and requlation dams (M. Puupponen)
- ○ Investigation of lake coastal currenst and hydrodynamic modelling of water quality (J. Sarkkula)
- ○ Service on precipitation and water equivalent of snow for hydropower plants and water utilities (J. Perälä)
- ○ Minor consultancy services (M. Puupponen)

Development

- ○ Finnish–Russian–English–German–Swedish–Estonian water conservation dictionary (L. Haverinen)

WATER RESEARCH OFFICE

Observation activities

■ Monitoring of water quality

- ○ Monitoring of water quality at river streamflow stations (A. Mäkelä)
- ○ Monitoring of water quality in lake deeps (A. Mäkelä)
- ○ Monitoring of water quality in the bordering rivers of Finland and USSR (A. Mäkelä)
- ○ Monitoring of water quality in the open sea and coastal waters (P. Kangas)
- ○ Monitoring of runoff water quality in small drainage basins (L. Kauppi)
- ○ Survey of the Lake Inarijärvi (E. Airaksinen)
- ○ Phytoplankton monitoring (P. Heinonen)
- ○ Automatic monitoring of water quality (E. Vuolas)
- ○ Monitoring of materisl input to the Baltic Sea by Finnish rivers (H. Pitkänen)
- ○ Monitoring of water quality by measurements of toxic substances in fish (V. Miettinen)
- ○ Worldwide monitoring programme of water quality in Finland (GEMS-water) (A. Mäkelä)

■ Data and Specimen Banks

- ○ Water quality data bank (V. Malin)
- ○ Data bank of toxic substances (V. Malin)
- ○ Bioregister (P. Heinonen)
- ○ Specimen bank for water and fish samples (M. Verta)
- ○ Data bank of methods for the analysis of water samples (V. Malin)

Research

■ Airborne pollutio

- ○ Inventory of acid lake
- ○ Effects of airborne ac systems (J. Kämäri)
- ○ Dynamics of surface (J. Kämäri)
- ○ Airborne heavy meta (M. Verta)
- ○ Effect of acid deposit (P. Kortelainen)
- ○ Monitoring of lake wa

■ Non-Point Loadin

- ○ Effects of the forest i quality (M. Ahtiainen
- ○ Effects of agriculture (L. Kauppi)
- ○ Effects of peat mining (L. Kauppi)
- ○ Ecological aspects in in northern Finland (

■ Toxic Substances

- ○ Toxicity testing of wa (V. Miettinen)
- ○ Development of phys organisms (V. Miettin
- ○ Changes in morpholo toxic substances in w
- ○ Leaching, occurrence aquatic environments
- ○ Study on mercury in the neighbouring coa

■ Biological Metho

- ○ Development and uti quality monitoring m
- ○ Health hazards associ (M. Niemi)
- ○ Investigation of wate watercourse (J. Niem
- ○ Littoral changes in co

■ Water Quality Mo

- ○ Construction of a ma bay (J. Niemi)

■ Special Investigat

- ○ Material balance of a
- ○ Particle distribution i (J. Niemi)

Development

- ○ Standardization of mi (M. Niemi)
- ○ Standardization of bi
- ○ Development of micr water administration
- ○ Water quality and us (P. Heinonen)
- ○ Development of wate Water District Office (J. Niemi)
- ○ Supervision of water (A. Mäkelä)
- ○ Coordination of inve effects of fish farmin (K. Kinnunen)

TECHNICAL OFFICE

Research

■ Soil and Ground

- ○ The influence of hun (E. Mälkki)

PROJECTS 1986

- Groundwater activities in the National Board of Waters, Finland (E. Rönkä)
- Effects of fertilization on the nitrogen contents of groundwater (E. Rönkä)
- Development of water supply of rural areas (E. Mälkki)

■ Non-Point Loading

- Leaching resulting from application of slurry (M. Melkas)
- Revision of drainage principles for reducing water acidity problems in acid sulphate soils (J. Palko)

■ Toxic Substances

- Occurrence and removal of specific pollutants from waste waters (M. Valve)
- Heavy metals in sewage sludge (M. Valve)

■ Industrial Waste Waters

- Performance of the biological treatment plants of forest industry effluents (J. Junna)
- Reducing the loading from fish farming cages (J. Junna)
- Treatment and disposal of sludges from forest industry effluent treatment (J. Junna)

■ Municipal Waste Waters

- Nitrification at sewage treatment plants (M. Mäkelä)
- Comparative studies between rotating biological filters and plastic biological filters (A. Reinikainen)
- Rapid filtration as supplementary treatment of domestic sewage (A. Latvala)
- Renovation of sewer networks (S. Välimaa)
- Phosphours removal in soil absorption (A. Latvala)
- Increasing the effectiveness of clarification in sewage treatment (S. Välimaa)
- Occurrence and removal of sewage bacteria (M. Valve)

■ Solid Wastes

- Survey of hazardous waste dumps (T. Assmuth)

■ Rehabilitation of Watercourses

- Aeration of shallow lakes (E. Lakso)
- Guidelines for the aeration of recipients (E. Lakso)

■ Geotechnical Research and Hydraulic Structures

- Earth dams on soft foundations (E. Loukola)
- Frost protection of earth dams (R. Kuusiniemi)
- Subsurface drainage of the areas with pressurized groundwater (E. Loukola)
- Settlement of drainageareas (E. Loukola)
- Tailing dams and dumps (J. Saarela)

Consultant Services

- Expert assignments on dam safety (E. Loukola)
- Geotechnical planning assignments and investigations (E. Loukola)

Development

- Nordic water and sewage project (M. Valve)
- U.N. International Drinking Water Supply and Sanitation Decade: research (M. Melanen)

RESEARCH LABORATORY

Observation Activities

■ Airborne Pollutants

- Monitoring of rainwater quality (O. Järvinen)
- Monitoring of wet and dry deposition (O. Järvinen)
- Metals in precipitation samples (O. Järvinen)

■ Analytical Services

- Analytical services for the Hydrological Office – monitoring projects (L. Karppinen)
- Analytical services for the Water Research Office – monitoring projects (I. Mäkinen)

Research

■ Chemical methods

- Determination of chlorinated phenols in natural waters (K. Korhonen)
- Testing of methods for pesticides (K. Korhonen)
- Utilization of mass fragmentography (K. Korhonen)
- Development of automatic chemical methods (L. Repetti)
- Development of methods for the determination of metals (L. Karppinen)
- Comparison and testing of methods for the determination of nitrogen (R. Niemi)
- Development of automatic methods by use of micro-electrothermofluidistic technique (L. Repetti)
- Determination of lignin and humic compounds (I. Mäkinen)

■ Analytical Services

- Analytical services for the Hydrological Office – research projects (L. Karppinen)
- Analytical services for the Water Research Office – research projects (I. Mäkinen)
- Analytical services for the Technical Research Office – research projects (K. Korhonen)

Consultant Services

■ Analytical Services

- Service for planning activities (K. Haapala)
- Service for construction (K. Haapala)
- Service for supervision (K. Haapala)
- Service for usage, care and maintenance of watercourses (K. Haapala)
- Service for other institutions (K. haapala)
- Service for Water District Offices (K. Haapala)
- Service financed by the water protection fees (K. Haapala)
- Observation activities for Water District Offices (K. Haapala)

Development

- Analytical quality control (I. Mäkinen)
- Standardization of methods for the examination of water quality (R. Niemi)
- Standardization of physico-chemical methods of analysis (K. Haapala)
- Testing of an improved method for the determination of aluminium (K. Haapala)
- Testing of physico-chemical standard methods (R. Niemi)
- Automated system for the registration of samples and for the calculation of results (K. Korhonen)

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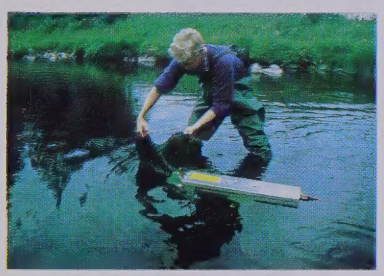
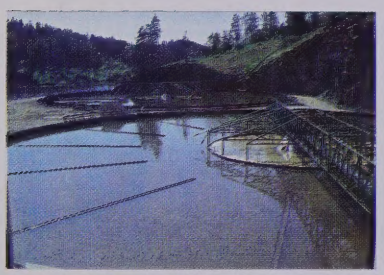
WATER RESEARCH INSTITUTE

The Water Research Institute was estabilished in 1970 with the status of an administrative department of the Finnish National Board of Waters. Its work covers most aspects of water research. The Institute employs 144 experts, 62 of whom have an academic degree. In addition, the offices of the 13 Finnish Water Districts have about 190 employees engaged in water research.

- **Activities (Allocation of Resources (1986): Observation of Water Resources (40 %); Research (30 %); Consultant Services (9 %); Development (3 %); Administration, Other Tasks (18 %)**
- **Units: Hydrological Office, Water Research Office, Technical Research Office, Research Laboratory**
- **Postal address: Water Research Institute, National Board of Waters, P.O.Box 436, 00101 Helsinki, Finland; Street address: Vuorikatu 24, 00100 Helsinki; Tel.: +358 0 19291 (int.), (90) 19291 (natl.)**
- **Director: Prof. S. Mustonen, Ph.D. in Civ.E.**





Hydrological Office

The office employs 59 experts, 23 of whom have an academic degree. Besides that are 1000 part time observers.

- **Activities (researcher-years 1986): Hydrological measurements (5), registration and publication of hydrological data (2), wintertime hydrology (0.5), soil and ground waters (1.5), airborne pollution of water resources, non-point loading (2.5), hydrological models (1.5), special investigations (1), consultant services (3), development, administration, other tasks (5.5)**
- **Postal address: Hydrological Office, National Board of Waters, P.O. Box 436, 00101 Helsinki, Finland; Street address: Vuorikatu 24, 00100 Helsinki; Tel.: + 358 0 19291 (int.), (90) 19291 (natl.)**
- **Chief: Mr. R. Lemmelä, Lic. in Geophysics**

Water Research Office

The office employs 25 experts, 15 of whom have an academic degree.

- **Activities (researcher-years 1986): Monitoring and water quality (3.5), data and specimen banks (1.2), airborne pollution of water resources (2.5), non-point loading (0.5), toxic substances (2), biological methods (2), water quality models (0.5), special investigations (1), development, administration, other tasks (2)**
- **Postal address: Water Research Office, National Board of Waters, P.O. Box 250, 00101 Helsinki, Finland; Street address: Pohjoinen Rautatiekatu 21 B, 00101 Helsinki; Tel.: +358 0 40281 (int.), (90) 40281 (natl.)**
- **Chief: Prof. R. Laaksonen, Ph.D. in Limnology**

Technical Research Office

The office employs 28 experts, 15 of whom have an academic degree.

- **Activities (researcher-years 1986): Soil and ground water (1), non-point loading and toxic substances (2.5), industrial waste waters (1), municipal waste waters (3), solid wastes (1.5), rehabilitation of watercourses, geotechnical research and hydraulic structures (2), consultant services (2), development, and administration (2.5)**
- **Postal address: Technical Research Office, National Board of Waters, P.O. Box 250, 00101 Helsinki, Finland; Street address: Pohjoinen Rautatiekatu 21 B, 00100 Helsinki; Tel.: +358 0 40281 (int.), (90) 40281 (natl.)**
- **Chief: Mr. H. Laikari, Lic. in Civ.E.**

Research Laboratory

The office employs 28 experts, 8 of whom have an academic degree.

- **Activities (researcher-years 1986): Observation activities (1.5), chemical methods and analytical services (1.5), consultant services (1), development, administration, other tasks (4)**
- **Postal address: Research Laboratory, National Board of Waters, P.O. Box 250, 00101 Helsinki, Finland; Street address: Kyläsaarenkatu 10, 00550 Helsinki; Tel.: +358 0 70971 (int.), (90) 70971 (natl.)**
- **Chief: Ms. K. Haapala, Lic. in Biochemistry**

Publications

The research results are published in three series of the national Board of Waters:

- Publications of the National Board of Waters
- Publications of the Water Research Institute
- Reports of the National Board of Waters

Publications are available without charge on an exchange basis from the library of the National Board of Waters (P.O. Box 250, 00101 Helsinki, Finland). They may also be purchased from the Government Printing Centre (P.O. Box 516, 00101 Helsinki, Finland).

National Board of Waters, Finland Helsinki 1986

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